Mitchell E. Daniels, Jr.
Governor

Judith A. Monroe, M.D.
State Health Commissioner

Indiana State Department of Health
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Health Care Provider Information
Diagnosing, Reporting and Management of Mumps

Contents:

REPORTING CRITERIA

Reporting Criteria

Indiana Administrative Code 410 IAC 1-2.3 stipulates that physicians and hospital administrators shall report cases and suspect cases of mumps (Sec. 47) to the local health officer in whose jurisdiction the patient was examined at the time the diagnosis was made or suspected. Laboratories are also required to report laboratory findings demonstrating evidence of mumps infection (Sec. 48) to the Indiana State Department of Health (ISDH). Local health department staff and ISDH Immunization Program field investigators will follow up on all mumps cases reported by physicians, hospitals, and laboratories.

What to Report:

- A suspect case meeting the clinical case definition for mumps (see Clinical Case Definition below).
- A confirmed case with laboratory evidence of mumps infection (see Laboratory Criteria for Diagnosis below) or that meets the clinical case definition and is epidemiologically linked to a confirmed or suspect case. A laboratory-confirmed case does not need to meet the clinical case definition.

  Clinical Case Definition: An illness with acute onset of unilateral or bilateral tender, self-limiting swelling of the parotid or other salivary gland lasting >2 days and without other apparent cause.

Laboratory criteria for diagnosis:

- Positive serological test for mumps immunoglobulin M (IgM) antibody*, or
- Significant rise between acute and convalescent phase titers in serum immunoglobulin G (IgG) antibody level by any standard serologic assay, or
- Isolation of mumps virus from clinical specimens, or
- Detection of virus by reverse transcription polymerase chain reaction (RT-PCR)

    - *Comment: False-positive IgM results by immunofluorescent antibody assays have been reported.

Case Classification:

- Probable: A case that meets the clinical case definition, has noncontributory or no serologic or virologic testing, and is not epidemiologically linked to a confirmed or probable case.

- Confirmed: A case that is laboratory confirmed or that meets the clinical case definition and is epidemiologically linked to a confirmed or probable case. A laboratory confirmed case does not need to meet the clinical case definition.

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LABORATORY SPECIMEN COLLECTION AND ANALYSIS

Comparison with viral culture and PCR performed at both CDC and the Iowa State Hygienic Lab has shown that serological (IgM and IgG) testing has poor predictive value for the detection of mumps cases related to the current Iowa outbreak. The IgM serologic tests have had many false positive and false negative results. Paired sera for IgG have often been falsely negative (i.e. NOT shown a four-fold or greater rise in titer in many of the viral culture and/or PCR confirmed cases). **Therefore, the ISDH recommends that for laboratory confirmation of the diagnosis of mumps, health care providers collect buccal swabs and/or urine specimens for viral culture and PCR testing.** Paired sera for IgG have shown correlation if a four-fold or greater rise in antibody titer is found. For questions, please contact the ISDH Laboratories at 317-233-8000.

Laboratory Testing Services

- ***Clinical Specimens***

Clinical specimens should be collected from all suspected cases. Clinical specimens (buccal swab, throat swab, or urine) should be obtained for virus detection by isolation in cell culture within 1-4 days of symptoms onset if possible; however, specimens collected up to 9 days post onset may be acceptable. Keep the samples cold (4C) or frozen (-70C). Avoid freeze-thaw cycles.

Parotid gland/buccal swabs of oral secretions may provide the best viral samples. Use a plastic shaft/Dacron tip swab for collecting swab samples. Massage the parotid gland area (the space between the cheek and teeth just below the ear) for about 30 seconds prior to collection of the buccal secretions. The parotid duct (Stensen's duct) drains in this space near the upper rear molars. A throat swab (oropharyngeal or nasopharyngeal swab (wire shaft/Dacron tip) can also be collected and added with the buccal swab. Place swab(s) in a tube containing 2-3 mls of viral transport media (VTM) or other sterile isotonic solution (phosphate buffered saline or cell culture medium). Swabs can be frozen at -70C or held at 4C until shipment.

Urine: Collect 5-10 ml of clean-catch urine and store in a screw-top sterile container, preferably a 15- or 25-ml centrifuge tube. Bulk urine should be kept cold (4C). Upon receipt at a facility equipped to centrifuge the sample, the urine is centrifuged at 4C for 10 minutes at 400 x g, recovering the sediment in 2-3 ml of sterile cell culture fluid or VTM. The urine sediment can be frozen at -70C or held at 4C until shipment.

The Virology/Immunology Request Form, State Form 35212 (R3/5-03), http://www.IN.gov/isdh/healthinfo/westnile/35212.pdf, should be completed and sent with the

specimens. *Please complete a separate form for each specimen*. Ship in an insulated container using ice packs or dry ice.

If clinical specimens for virus isolation will be delivered via courier, pack specimens according to the shipping requirements for Category B Infectious Substances and route to:
Indiana State Department of Health Laboratories
Attn: Virology Lab
7230 Western Select Drive
Indianapolis, Indiana 46219

If specimens will be delivered via U.S. Postal Service, pack specimens according to U.S. Postal Service shipping requirements for diagnostic/clinical specimens and route to:
Indiana State Department of Health Laboratories
Attn: Virology Lab
P.O. Box 7203
Indianapolis, Indiana 46207-7203

If sending by mail, package to meet USPS shipping requirements for diagnostc/clinical specimens and send to:

Indiana State Department of Health Laboratories
Attn: Virology Lab
P.O. Box 7203
Indianapolis, Indiana 46207-7203

- ***Serological Specimens***

See statement above regarding the reliability of serological analysis for mumps disease. Serum should be collected as soon as possible after onset of symptoms for IgM antibody testing. An additional serum specimen should be obtained 2-4 weeks after onset to assess rise in IgG antibody titer.

Submit at least 3 ml of serum in the plastic screw-capped vial provided in the mailing container (ISDH type 9A). Store and ship specimens cold (using ice packs). Serum specimens may be shipped without refrigeration in suitable mailing container (e.g., ISDH type 9A). Serum is the preferred specimen, but 5-10 ml of whole blood is acceptable.

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If specimens will be delivered via U.S. Postal Service, route to:
Indiana State Department of Health
Virology/Immunology
P.O. Box 7203
Indianapolis, Indiana 46207-7203

If specimens will be delivered via courier/drop off, route to:
Indiana State Department of Health
Virology/Immunology
635 North Barnhill Drive, Room MS2023
Indianapolis, Indiana 46202

ISDH type 9A mailing containers and Virology/Immunology Request Forms can be obtained from the ISDH Laboratories by telephone at 317.233.8105 or by e-mail at Containers@isdh.IN.gov. The Virology/Immunology Request Form, State Form 35212 (R3/5-03), http://www.IN.gov/isdh/healthinfo/westnile/35212.pdf, should be completed and sent along with serological specimens.

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CLINICAL DIAGNOSIS OF MUMPS DISEASE

It is critical that clinicians make a sound clinical diagnosis of mumps, since individuals diagnosed with mumps will be excluded from public activities based on this initial diagnosis pending laboratory evidence of infection. The following information is offered to aid the clinician in diagnosing and reporting mumps disease.

The clinical case definition for mumps (above) **emphasizes involvement of the parotid gland or other salivary glands without other apparent cause** as important features in the diagnosis of mumps infection**.** The clinical course of mumps often involves a prodromal period of several days with symptoms of headache, fever, anorexia, vomiting or general malaise, followed by enlargement of one or both parotid glands. Swelling of each parotid gland may be separated by a few days to more than a week. The swelling is a brawny type of edema (the borders of the parotid glands are not discrete) and usually obscures the angle of the jaw. This poor definition of the borders of the parotid gland is a distinctive finding when contrasted to swelling typical of the inflammation associated with lymphadenitis, in which lymph nodes generally can be palpated easily through the swelling. Mumps involvement of the submandibular salivary glands is rare.

Photographs of people with mumps infection can be accessed through the CDC web site at NIP: Diseases/Mumps/Mumps Technical Q&As. Scroll to the References section at the end of the Mumps - Technical Q & A section and click on the link to the Red Book online chapter on mumps for the photographs.

While there are a variety of viruses that can cause parotitis, during the current mumps outbreak it is helpful to maintain a reasonable index of suspicion for mumps infection. However, it is not indicated that patients with common illnesses such as Group A streptococcal throat infection, otitis media, infectious mononucleosis, or enlarged cervical lymph nodes associated with other infections have laboratory testing performed for mumps infection.

Additional information regarding the physical findings and complications of mumps can be found at the CDC web site at NIP: Diseases/Mumps/Physical Findings-Complications of Mumps

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MUMPS PREVENTION THROUGH IMMUNIZATION

The principal strategy to prevent mumps is to achieve and maintain high immunization levels. The Advisory Committee on Immunization Practices (ACIP) recommends that all preschool-aged children 12 months of age and older receive one dose of MMR, all school-aged children receive two doses of MMR, and all adults have evidence of immunity against mumps. Two doses of MMR vaccine are more effective than a single dose. Consequently, during outbreaks and for at-risk populations, ensuring high vaccination coverage with two doses is encouraged. Hospital and other health care workers (HCW) are considered to be at significant risk for acquiring or transmitting mumps disease, and, therefore, documentation of immunity should be available for all HCWs at their place of employment. HCWs can be considered immune to mumps if a person:

- Has documentation of adequate immunization (two doses preferred for health care workers), or
- Was born before 1957*, or
- Has serologic evidence of mumps immunity

All HCWs (i.e., medical or nonmedical, paid or volunteer, full- or part-time, student or non-student, with or without patient care responsibilities) should be immune to mumps. All new staff should be assessed for mumps immunity.

*Birth in the U.S. before 1957 does not necessarily guarantee mumps immunity. Therefore, it is recommended that HCWs have documentation of at least one dose, and preferably two doses, of MMR vaccine on or after the first birthday or serologic proof of immunity. An effective, routine MMR vaccination program for HCWs (in addition to standard precautions) is the best approach to prevent nosocomial transmission.

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HEALTH CARE PROVIDER RECOMMENDATIONS

Control of Cases and Contacts

- Cases: Persons infected with mumps should be excluded from school, daycare centers, public gatherings (including workplaces) and contact with susceptible persons outside the household for nine days* after the onset of swelling. The infected person may return to normal activities on the tenth day following the onset of swelling.
- Contacts: All contacts should be evaluated for immune or vaccination status. If a person is not known to be immune to mumps, refer for vaccination. If a person has a contraindication or refuses vaccination, educate on personal protective measures and symptoms of mumps. Note: Mumps vaccination will not prevent infection in a person who has been recently exposed, but vaccinating may prevent future cases and outbreaks.

MANAGING MUMPS IN HEALTHCARE SETTINGS

Employee Immunity

Hospital and other health care workers (HCWs) are considered to be at significant risk for acquiring or transmitting mumps disease and therefore documentation of immunity should be available for all health care workers at their place of employment. Health care workers can be considered immune to mumps if a person:

- Has documentation of adequate immunization (two doses preferred for health care workers), or
- Was born before 1957 (see note below), or
- Has serologic evidence of mumps immunity

All HCWs (i.e., medical or nonmedical, paid or volunteer, full- or part-time, student or non-student, with or without patient-care responsibilities) should be immune to mumps. All new staff should be assessed for mumps immunity.

Note: Birth in the U.S. before 1957 does not necessarily guarantee mumps immunity. Therefore, it is recommended that healthcare workers should have documentation of at least one dose, and preferably two doses, of mumps-containing vaccine on or after the first birthday or serologic proof of immunity. An effective routine MMR vaccination program for healthcare workers (in addition to standard precautions) is the best approach to prevent nosocomial transmission.

Isolation of patients

Patients

- Patients with mumps should be placed on droplet precautions for the duration of their hospitalization.

Exposed susceptible patients

- Exposed susceptible patients should be placed on droplet precautions from the 12th day after the earliest exposure through the 25th day after the last exposure. They may be taken off precautions on the 26th day.

Exclusion of Healthcare Staff

- Personnel who become infected with mumps should be excluded from work for nine days or until symptoms resolve, whichever is later. Personnel who have been exposed to a mumps case and are susceptible should be vaccinated and should remain home from the 12th day after the first exposure through the 25th day after their last exposure. Consult the ISDH for special situations.
- Surveillance: Conduct active surveillance for mumps for two incubation periods (50 days) after onset of the last case.

Preventive Measures

- Vaccination of all susceptibles with MMR is the best preventive measure against mumps. For more information on the measles, mumps and rubella vaccine, see the ACIP vaccine information statement.
- Good personal hygiene (which consists of proper hand hygiene, disposal of used tissues, not sharing eating utensils, etc.) is also important

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DISEASE DESCRIPTION

Etiologic Agent
Mumps is caused by the mumps virus (genus *Paramyxovirus*, family Paramyxoviridae).

Clinical Description
Mumps is a systemic disease characterized by swelling of the salivary glands, which usually lasts several days. However, an estimated 20-30% of cases are asymptomatic. Respiratory symptoms are common. Encephalitis occurs rarely, and permanent sequelae or death is uncommon. Infection in adulthood is likely to produce a more severe disease, including mastitis, which occurs in up to 31% of females aged > 15 years, and orchitis, which occurs in 20%–30% of post-pubertal males. Other rare complications include arthritis, renal involvement, myocarditis, cerebellar ataxia, pancreatitis, and hearing impairment. Mumps infection during the first trimester of pregnancy can increase the risk of spontaneous abortion, although no evidence exists that it causes congenital malformations. While death due to mumps is rare, more than half the fatalities occur in those > 19 years of age. Mumps should not be ruled out in someone who is vaccinated if he or she has clinically consistent symptoms.

Note: Swelling of the salivary glands can also be caused by infection with cytomegalovirus, parainfluenza virus types 1 and 3, influenza A, Coxsackie A, echovirus, lymphocytic choriomeningitis virus, HIV, and non-infectious causes such as drugs, tumors, immunologic diseases, and obstruction of the salivary duct.

Reservoirs
Humans are the only known reservoirs.

Modes of Transmission
Mumps is transmitted by droplet or direct contact with nasopharyngeal secretions of an infected person and by the airborne route.

Incubation Period
The incubation period is usually 16 – 18 days, with a range of 14 – 25 days.

Period of Communicability or Infectious Period
From 3 days prior to onset of symptoms to nine (9) days* after symptom onset.

*****The state of Iowa is currently using a five-day period following symptoms onset for the contagious period. The rationale is based on other expert body recommendations. Indiana will follow the current Centers for Disease Control and Prevention (CDC) recommendations, which uses nine days following onset of symptoms as the contagious period, until further notice.